

REMARKS

Claims 1, 2, 3, 5, 6, 10 - 14 and 17 - 21 are in this application and are presented for consideration. Claims 2, 3, 6, 10 and 17 have been amended and new claims 18 - 21 have been added.

The specification has been amended to incorporate the Examiner's suggestions, and to place it in better form. Applicant thanks the Examiner for providing suggestions.

The drawings have been objected to as failing to show precision forging as specified in claims 8 and 9. Claims 8 and 9 have been canceled. Therefore this objection to the drawings is now moot.

Claim 3 has been objected to for line 3 having a double inclusion of "a bar stock". Applicant has reviewed original claim 3 and finds no indication of the phrase "a bar stock" in line 3. Applicant notes that claim 3 starts on page 9 and ends on page 10. Applicant has noticed that the phrase "a bar stock" is present twice in line 6. Applicant also notes that the first phrase "a bar stock" refers to the structure of the bar stock itself. The second phrase "a bar stock" is an adjective describing a cross-section. In particular the entire second phrase is "a bar stock cross-section". Since the first phrase refers to the bar stock itself, and the second phrase refers to a cross-section of the bar stock, it is Applicant's position that the second phrase is not a double inclusion. If the Examiner has any comments or suggestions for alternate wording of these features, the Examiner is invited to contact Applicant's representative by telephone.

The independent claims have been rejected as being anticipated by SU617144.

Applicant thanks the Examiner for providing a translation of SU'144. Applicant notes that the translation received does not appear to be complete. Applicant thanks the Examiner for discussing the incomplete translation of a telephone, and regrets that the Examiner was unable to spend the time to determine if the translation received by Applicant matched the translation in the Examiner's records.

With this Amendment, claims 1, 3 and 14 set forth the step of hot rolling bar stock into a cross-section that is substantially rhomboidal. Applicant finds no teaching nor suggestion in '144 of the step of hot forming bar stock into a rhomboidal cross-section. Applicant finds '144 to describe strips of shaped rhomboidal cross-section being used as the initial blank. This reference also describes how this initial blank is subsequently processed. However '144 appears to be silent with regard to how the initial blank is made. Applicant notes that '114 does describe rolling, but this rolling is only performed on an already rhomboidal shaped initial billet. There is no teaching nor suggestion in '144 of the rolling being performed to create the initial rhomboidal cross-section billet. Since '144 is silent with regard to how the rhomboidal cross-section is formed, '144 cannot anticipate the steps in the claims which form the rhomboidal cross-section. Since this step of forming the rhomboidal cross-section is not present in '144, the independent claims define over '144.

Claims 1, 3 and 10 also set forth the step of machining the blank to form the blades. Applicant has reviewed '144, and finds no teaching nor suggestion of machining a blank to form a blade. Instead it appears that the periodic rolling performed after the heating in '144 shapes

the blade. Applicant notes that '144 describes that "after a periodic rolling is carried out - edges of billets of blades, having a magnitude of 1mm... is produced".

Claims 2, 3 and 10 set forth that the machining step is performed on blanks with the rhomboidal cross-section. In '144, it appears that rolling is performed on any rhomboidal shaped billets, and this rolling shapes the feather end blade footing of the blade. Therefore after the rolling in '144, the billet does not have the initial rhomboidal cross-section, but instead has the cross-section of the blade feather and foot. Therefore '144 does not teach nor suggest the machining step as set forth in these claims. These claims therefore further define over '144.

Claims 2, 5 and 11 set forth that the machining is milling. Applicant finds no teaching nor suggestion in '144 of a machining step, and especially not a machining step where the machining is milling. These claims therefore further define over '144.

Claims 1, 3, and 10 set forth that the forming of the input stock is performed to have the input stock be larger than the maximum cross-section of the blades by a machining allowance. Applicant finds no teaching nor suggestion in '144 of a machining allowance. The rejection states that '144 describes an oversize for machining of 1mm - 3mm. Applicant only finds '144 to describe rolling the billet to create edges which have a magnitude of 1mm - 2.5mm. Applicant notes that these edges are not machining allowances or oversizes, but instead describe how thick an edge of the billet is made. The edge is where two surfaces of the blade of the prior art meet. Well known edges of a blade, are the leading edge and the trailing edge. There appears to be an advantage in '144 that the thinner these edges are, the better the blade is. However these edges are not machining allowances, and therefore this portion of '144

cannot anticipate the machining allowance of claims 1, 3 and 10.

Claims 13 and 17 set forth further features of the machining allowance. Since '144 does not describe a machining allowance, '144 therefore can further not describe the additional features set forth in these claims. These claims therefore further define over '144.

Claim 6 has been rejected as being obvious over '144 in view of Benedetti. Benedetti is used to teach the step of hot rolling on a mill train with rollers that are calibrated to the bar stock cross-section. Applicant has reviewed Benedetti, and finds no teaching nor suggestion of rollers that are calibrated to a bar stock cross-section.

The rejection states that it would have been obvious to employ the step of hot rolling as taught by Benedetti on the method of '144 so as to manufacture fine product of bar stock. Applicant notes that the incentive or motivation to combine references must be found in the prior art, or in the general knowledge. Applicant finds no incentive or motivation that any hot rolling in Benedetti would manufacture fine product of bar stock for the turbine and compressor blades of '144. Absent any other teaching, Benedetti could actually be disadvantageous.

The combination of the hot rolling into a rhomboidal cross-section and then machining the rhomboidal cross-section has an advantage that is described in the present specification, and is not found in the prior art. This particular combination leads to a blade which is very efficient in operation, but also cost effective. Manufacturing by hot rolling the input bar stock into a rhomboidal cross-section, is more expensive than forming rolled stock of regular cross-section. However this manufacturing by hot rolling offers a decisive cost advantage in the special field of manufacturing turbine blades by machining. Machining a blade results in a more precise

shape of the blade, and this results in turbine which is more efficient. When the machining is combined with the hot forming into the rhomboidal shape, less machining is required afterward to bring the blade to the desired final dimension. Therefore the machining costs are less in the present invention when the bar stock is hot rolled into a rhomboidal shape. Therefore the present invention can provide a more precise shape of the blade, and a more efficient turbine for less cost, even though the blades are machined. In '144, the blades are formed by periodic rolling, and this results in a blade that is not as precise as machining, and therefore a turbine which is less efficient. By the present invention combining hot rolling a bar stock into a rhomboidal shape, and then machining the rhomboidal shape, the present invention has the advantage of a more precise blade, but not the disadvantage of a high cost if machining was performed on rectangular stock.

The present invention therefore results in a turbine blade which is more precise in its final shape, a turbine which is more efficient, and an economical manufacturing cost. It is Applicant's position that the present invention is an improvement over the prior art, especially '144 which produces a very imprecise blade. Applicant respectfully requests patent protection for this improvement.

If the Examiner has any comments or suggestions which would further favorable prosecution of this application, the Examiner is invited to contact Applicant's representative by telephone to discuss possible changes.

At this time Applicant respectfully requests reconsideration of this application, and based on the above amendments and remarks, respectfully solicits allowance of this application.

Respectfully submitted
for Applicant,

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